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10/582,673	06/22/2006	Toshiyuki Inagaki	128357	5009

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EXAMINER	
WALKER, KEITH D	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
08/31/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction25944@oliff.com
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Office Action Summary	Application No.	Applicant(s)	
	10/582,673	INAGAKI, TOSHIYUKI	
	Examiner	Art Unit	
	KEITH WALKER	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 July 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-29 and 31-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-29 and 31-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

In response to the amendment received 7/27/10: Claim 30 is cancelled; Claims 27-29 & 31-39 are pending; the objection of claim 27 is withdrawn; the rejection of claims 27-39 under 35 USC 112 is withdrawn.

Claim Rejections - 35 USC § 103

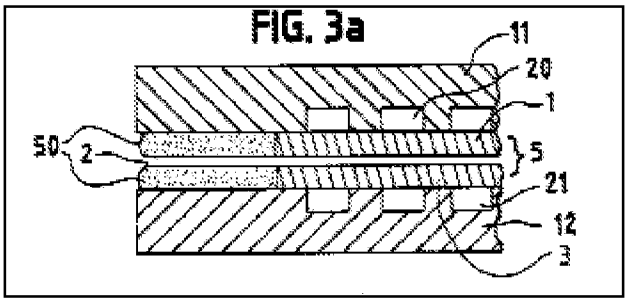
The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 27-29 and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,080,503 (Schmid) in light of Araldite® 2018 Technical Data Sheet (Araldite).

Regarding claim 27, Schmid discloses a fuel cell stack (see fig. 1) comprising: a pair of separators (11, 12); an MEA (5) in which an electrolyte membrane (2), a catalyst layer, and a diffusion layer (electrode layers 1, and 3) are laminated (see col. 1, lines 21-33), and which is provided between the pair of the separators; and an adhesive layer (50) provided between the pair of the separators, which contacts at least an end of the electrolyte membrane, an end of the catalyst layer and an end of the diffusion layer (see fig. 3a). Schmid discloses two possible MEA configurations, one where the membrane extends beyond the electrodes, and another where the membrane is

coextensive with the electrodes (see col. 6 line 61 – col. 7, line 5). In both configurations the adhesive layer would contact at least an end of the membrane, catalyst layer, and diffusion layer.



Schmid fails to explicitly disclose a fuel cell stack wherein the adhesive layer has a Young's modulus of 30 MPa to 50 MPa.

However, Schmid does disclose that PUR, such as Araldite 2018, is suitable for use in his invention (5:43-44). Araldite 2018 has a tensile modulus (also known as Young's Modulus) of 16 MPa (see Araldite pg 3/5). Claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (MPEP 2144.05) Claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result, which is different in kind and not merely in degree from the results of the prior art. (MPEP 2144.05) Discovery of optimum ranges of a result effective variable in a known process is ordinarily within the skill of art and selection of the optimum ranges within the general condition is obvious. (MPEP 2144.05) Schmid's disclosure of Araldite 2018, which has a tensile modulus of 16 MPa, and applicants' claimed Young's Modulus of 30 MPa are not significantly different from each other. It is noted that Applicant teaches

away from a conventional adhesive layer with a Young's Modulus of greater than 100 MPa ([0051] of instant specification). Schmid's invention clearly is able to utilize an adhesive with a tensile modulus of 16 Mpa, which falls within the disclosed range of the instant specification. Therefore, the burden is upon Applicant to prove criticality or unexpected results for the adhesive within the claimed range.

Regarding claim 28, Schmid discloses the fuel cell stack according to claim 27, wherein; the electrolyte membrane has an extended portion which extends beyond the end of the catalyst layer and the end of diffusion layer (*Schmid:* 6:61-67), and a portion of the adhesive layer is provided between the extended portion of the electrolyte membrane and one of the pair of separators so as to contact a surface of the extended portion, and another portion of the adhesive layer is provided between the extended portion of the electrolyte membrane and another of the pair of separators so as to contact another surface of the extended portion (*Schmid:* fig. 3a). Schmid discloses that the catalyst layer is provided at the interface between electrode layer and the PEM layer (1:26-30). Therefore, if the PEM is extended beyond the electrode layer, then it also would be extended beyond the catalyst layer as well.

Regarding claim 29, Schmid discloses the fuel cell stack according to claim 27, wherein; a portion of the adhesive layer is provided between one of the pair of the separators and the catalyst layer so as to contact a surface of the catalyst layer; and another portion of the adhesive layer is provided between another of the pair of the separators and the diffusion layer so as to contact a surface of the diffusion layer. Schmid clearly shows in fig. 3a that the adhesive layer (50) contacts a surface of the

diffusion layer. Although the catalyst layer is not shown in fig. 3a, Schmid discloses that the catalyst layer is located at the interface between the electrode (diffusion layer) and PEM layer (1:25-30). Therefore the adhesive layer would necessarily contact a surface of the catalyst layer as well.

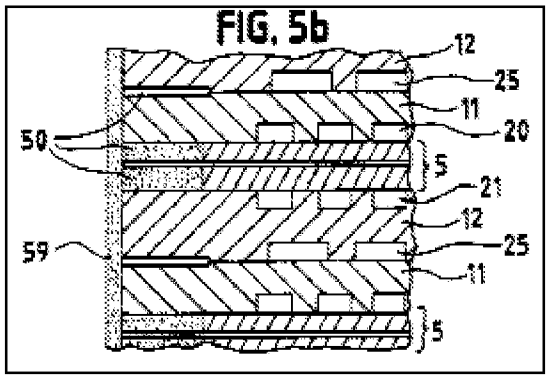
Regarding claim 35, Schmid discloses the fuel cell stack according to claim 27, wherein multiple cells, each of which is formed by interposing the MEA between the pair of separators, are linearly arranged in a cell stacking direction, and the fuel cell stack further comprises an adhesive layer sandwiched between two cells adjacent to each other (*Schmid:* see col. 4, lines 32-34, see fig. 5b).

Regarding claim 36, Schmid discloses the fuel cell stack according to claim 27, wherein multiple cells, each of which is formed by interposing the MEA between the pair of separators, are linearly arranged in a cell stacking direction, and a bead gasket is provided as a seal between two of the multiple cells, which are adjacent to each other, and a separator of the two of the multiple cells which contacts the bead gasket has a greater planar rigidity than a separator of another cells which does not contact the bead gasket. Schmid discloses that some of all the cells in the stack may be adhesively bonded together, and stack components such as end plates may also be adhesively bonded to adjacent components if so desired (see col. 4, lines 31-41). The adhesive layer disclosed by Schmid acts as a bead gasket. The term “bead gasket” does not limit the adhesive to any shape, and this claim is met as long as it provides a seal between multiple cells. It is obvious that cells which contact the bead gasket would have greater

planar rigidity than a separator of another cell which does not contact the bead gasket because the bead gasket provides an extra adhesive bond.

Regarding claim 37, Schmid discloses the fuel cell stack structure according to claim 36, further comprising a generally flat plate which is placed on the separator which contacts the bead gasket to increase the planar rigidity of the separator. Schmid discloses that a flat plate (end plate) may be adhesively bonded to adjacent components, which would be the separator (see col. 4, lines 38-41).

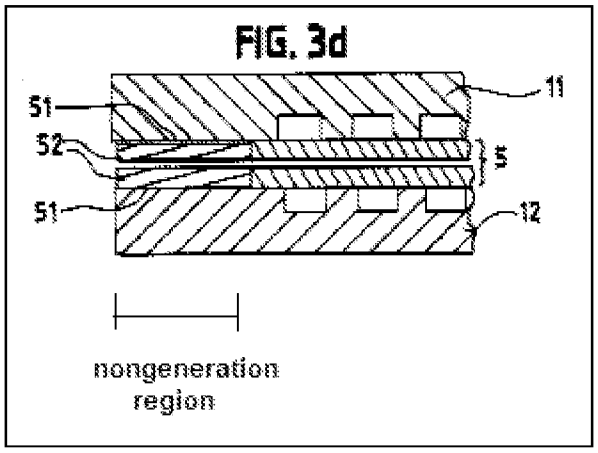
Regarding claim 38, Schmid discloses the fuel cell stack according to claim 27, wherein the adhesive layer is provided between the separators in an entire non-power generation region (*Schmid*: see fig. 3a, see col. 4, lines 2-6).



2. Claims 27 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,080,503 (Schmid) in light of Araldite® 2018 Technical Data Sheet (Araldite).

Regarding claim 27, Schmid discloses a fuel cell stack (see fig. 1) comprising: a pair of separators (11, 12); an MEA (5) in which an electrolyte membrane (2), a catalyst layer, and a diffusion layer (electrode layers 1, and 3) are laminated (see col. 1, lines 21-33), and which is provided between the pair of the separators; and an adhesive layer

(52) provided between the pair of the separators, which contacts at least an end of the electrolyte membrane, an end of the catalyst layer and an end of the diffusion layer (see fig. 3d). Schmid discloses two possible MEA configurations, one where the membrane extends beyond the electrodes, and another where the membrane is coextensive with the electrodes (see col. 6 line 61 – col. 7, line 5). In both configurations the adhesive layer would contact at least an end of the membrane, catalyst layer, and diffusion layer.



Schmid fails to disclose a fuel cell stack wherein the adhesive layer has a Young's modulus of at most within the range of 30 MPa to 100 MPa.

However, Schmid discloses that PUR, such as Araldite 2018, is suitable for use in his invention (5:43-44). Araldite 2018 has a tensile modulus (also known as Young's Modulus) of 16 MPa (see Araldite pg 3/5). Claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (MPEP 2144.05) Claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result, which is different in kind and not merely in degree from the results of the prior art. (MPEP

2144.05) Discovery of optimum ranges of a result effective variable in a known process is ordinarily within the skill of art and selection of the optimum ranges within the general condition is obvious. (MPEP 2144.05) Schmid's disclosure of Araldite 2018, which has a tensile modulus of 16 MPa, and applicants' claimed Young's Modulus of 30 MPa are not significantly different from each other. It is noted that Applicant teaches away from a conventional adhesive layer with a Young's Modulus of greater than 100 MPa ([0051] if instant specification). Schmid's invention clearly is able to utilize an adhesive with a tensile modulus of 16 MPa, which is within the disclosed range of the instant specification. Therefore, the burden is upon Applicant to prove either criticality or unexpected results for the adhesive within the claimed range.

Regarding claim 32, Schmid discloses the fuel cell stack according to claim 27, wherein a rigid spacer (51) is provided in the adhesive layer (52) (*Schmid:* see fig. 3d). Barring specification as to the composition of the rigid spacer, an adhesive film made of epoxy, a known hard substance, will be interpreted as meeting the claim (7:62-63; 5:35-40).

Regarding claim 33, Schmid discloses the fuel cell stack according to claim 32, wherein the rigid spacer (51) is provided in the adhesive layer (52) throughout a non-generation region (see annotated fig. 3d).

Regarding claim 34, Schmid fails to explicitly disclose the fuel cell stack according to claim 32, wherein the adhesive layer has a thickness that allows the adhesive layer to have a Young's modulus of at most 100 MPa with the rigid spacer provided in the adhesive layer.

However, the same reasoning as discussed above for claim 27, applies here. Therefore the burden is upon Applicant to prove unexpected results within the claimed range.

3. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,080,503 (Schmid) in light of Araldite® 2018 Technical Data Sheet (Araldite) as applied to claim 27 above, and further in view of US 6,316,139 (Uchida).

The teachings of Schmid and Araldite as discussed above are incorporated herein.

Regarding claim 31, Schmid fails to disclose the fuel cell stack structure according to claims 27, wherein; the adhesive layer has a thickness of 50 μm to 150 μm.

However, Uchida teaches a fuel cell having a gasket with an adhesive layer, wherein the adhesive layer has a thickness of preferably 10-300 μm. Uchida also teaches that the adhesive layer needs to be thick enough to achieve insulation and sealing between adjacent separators while absorbing the thickness of the ion exchange membrane, therefore proving that it is a result effective variable (see col. 4, lines 4-8). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art (see MPEP § 2144.05, II.). Therefore it would have bee obvious to a person of ordinary skill in the art to optimize the thickness taught by Uchida.

4. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,080,503 (Schmid) in light of Araldite® 2018 Technical Data Sheet (Araldite) as applied to claim 27 above, and further in view of US 2001/0049074 (Mizuno).

The teachings of Schmid and Araldite as discussed above are incorporated herein.

Regarding claim 39, Schmid fails to disclose the fuel cell stack according to claim 27, wherein the adhesive layer contains rigid beads each of which has a diameter equal to or smaller than a thickness of the adhesive layer.

However, Mizuno teaches a fuel cell having a gasket with an adhesive layer, wherein the adhesive layer contains resin beads of a predetermined diameter in order to regulate the thickness of the adhesive layer (see paragraphs 22 and 57). Since the resin beads regulate the thickness of the adhesive layer, it is obvious that the resin beads would have a diameter equal to or smaller than the thickness of the adhesive layer. The combination of familiar elements is likely to be obvious when it does no more than yield predictable results (see KSR, MPEP § 2143, A.). Therefore, it would have been obvious to a person of ordinary skill in the art to combine the resin beads taught by Mizuno with the adhesive layer taught by Schmid in order to regulate the thickness of the adhesive layer.

5. Claims 27-29 and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,080,503 (Schmid) in view of Applicant's arguments dated 7/27/10 and US 2004/0197563 (Kye).

The teachings of Schmid as discussed above are incorporated herein.

Schmid is silent to the adhesive layer having a young's modulus of 30 to 50 MPa. As presented by applicant in the arguments of 7/27/10, using an adhesive with a young's modulus of 30-50 Mpa is well known in the art of fuel cells (pg 5-6). Schmid teaches using an adhesive having a young's modulus of 16Mpa. While this adhesive's value is half the claimed lower range, using an adhesive with a young's modulus with a higher value of 30-50 MPa is obvious to one of ordinary skill in the art since both the material is known in the art, as disclosed by applicant, and how the adhesive would function is well known in the art. As previously discussed in earlier Office Action's, Kye teaches adhesive compositions and the factors and results that occur from choosing different adhesives with different young's modulus numbers. While Kye's adhesive compositions are applied to the vehicle industry, the general teachings of the properties and interactions of the adhesives applies to all arts ([0001-0003]). Since Schmid has already discussed using adhesives in fuel cells for bonding components, Kye's teachings are applicable. Kye teaches that by varying the young's modulus of an adhesive material, the tensile strength changes and the percentage of elongation before breaking changes (Table XXIX; [0151-0155]). So by increasing the young's modulus of the adhesive material, the tensile strength increases and the amount of elongation before the adhesive breaks decreases.

Therefore, one of ordinary skill in the art could optimize the properties of tensile strength and elongation to match the type and operating conditions of the fuel cell. It would have been obvious to one having ordinary skill at the time of the invention to vary

young's modulus of the adhesive material, since it is held that discovering an optimum value of a result effective variable involves only routine skill in the art (MPEP 2144.05 II). Use of known technique to improve similar devices in the same way and applying a known technique to a known device ready for improvement to yield predictable results is obvious to one of ordinary skill in the art (MPEP 2141 III).

6. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,080,503 (Schmid) in view of Applicant's arguments dated 7/27/10 and US 2004/0197563 (Kye) as applied to claim 27 above, and further in view of US 6,316,139 (Uchida).

The teachings of Schmid, applicant's arguments, Kye and Uchida as discussed above are incorporated herein.

Regarding claim 31, Schmid is silent to the adhesive layer having a thickness of 50 μm to 150 μm.

Uchida teaches a fuel cell having a gasket with an adhesive layer, wherein the adhesive layer has a thickness of preferably 10-300 μm. Uchida also teaches that the adhesive layer needs to be thick enough to achieve insulation and sealing between adjacent separators while absorbing the thickness of the ion exchange membrane, therefore proving that it is a result effective variable (see col. 4, lines 4-8). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art.

(MPEP § 2144.05 II). Therefore it would have bee obvious to a person of ordinary skill in the art to optimize the thickness taught by Uchida.

7. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,080,503 (Schmid) in view of Applicant's arguments dated 7/27/10 and US 2004/0197563 (Kye) as applied to claim 27 above, and further in view of US 2001/0049074 (Mizuno).

The teachings of Schmid, applicant's arguments, Kye and Mizuno as discussed above are incorporated herein.

Regarding claim 39, Schmid fails to disclose the adhesive layer containing rigid beads, each of which has a diameter equal to or smaller than a thickness of the adhesive layer.

Mizuno teaches a fuel cell having a gasket with an adhesive layer, wherein the adhesive layer contains resin beads of a predetermined diameter in order to regulate the thickness of the adhesive layer (see paragraphs 22 and 57). Since the resin beads regulate the thickness of the adhesive layer, it is obvious that the resin beads would have a diameter equal to or smaller than the thickness of the adhesive layer. The combination of familiar elements is likely to be obvious when it does no more than yield predictable results (see KSR; MPEP § 2143, A). Therefore, it would have been obvious to a person of ordinary skill in the art to combine the resin beads taught by Mizuno with the adhesive layer taught by Schmid in order to regulate the thickness of the adhesive layer.

Response to Arguments

Applicant's arguments filed 7/27/10, regarding the prior art, have been fully considered but they are not persuasive.

As discussed by applicant, the use of an adhesive with the claimed young's modulus in the fuel cell art is well known. The effects and properties of that adhesive would also be well known. As well established in prior Office Actions and supported by at least the teachings of Kye, varying the young's modulus of an adhesive material varies other properties of the material, namely, the tensile strength and the percent elongation before breaking. These variables are taught to change as the young's modulus changes and Kye teaches how to make and vary these properties to obtain the desired results. Furthermore, it is well established that optimization of such variables are well within the prevue of one of ordinary skill in the art as long as a parameter is recognized as a result-effective variable (MPEP 2144.05 II B). This relationship is established by the teachings of at least Kye.

Applicant has provided no evidence of criticality or unexpected results for the claimed range of 30-50 Mpa.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH WALKER whose telephone number is (571)272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Keith Walker/
Primary Examiner, Art Unit 1795